CHAPTER 31

SPECIAL CONSTRUCTION

780 CMR 3101.0 GENERAL

3101.1 Scope: In addition to the general requirements of 780 CMR governing the design and construction of all structures, the provisions of 780 CMR 31 shall control the special structures and construction features as herein provided.

780 CMR 3102.0 SIGNS

3102.1 General: The provisions of 780 CMR 3102.0 shall govern the construction, *alteration*, repair and maintenance of all *signs* together with the associated appurtenant and auxiliary devices in respect to structural and fire safety.

3102.2 Definitions: The following words and terms shall, for the purposes of 780 CMR 3102.0 and as used elsewhere in 780 CMR, have the meanings shown herein.

Sign: Any fabricated sign or outdoor display structure, including its structure, consisting of any letter, figure, character, mark, point, plane, marquee sign, design, poster, pictorial, picture, stroke, stripe, line, trademark, reading matter or illuminating device, which is constructed, attached, erected, fastened or manufactured in any manner so that the same shall be used for the attraction of the public to any place, subject, person, firm, corporation, public performance, article, machine or merchandise, and displayed in any manner out of doors for recognized advertising purposes.

Closed sign: A *sign* in which more than 50% of the entire area is solid or tightly enclosed or covered.

Ground sign: A *sign* supported by uprights or braces in or upon the ground surface.

Marquee sign: A *sign* attached to or hung from a marquee, canopy or other covered structure, projecting from and supported by the building and extending beyond the building wall, building line or *street lot line*.

Open sign: A *sign* in which at least 50% of the enclosed area is uncovered or open to the transmission of wind.

Portable sign: A *sign*, usually of a temporary nature, not securely anchored to the ground or to a building or structure and which obtains some or all of its structural stability with respect to wind or other normally applied forces by means of its geometry or character.

Projecting sign: A display *sign* which is attached directly to the building wall, and which extends more than 15 inches (381 mm) from the face of the wall.

Roof sign: A *sign* which is erected, constructed and maintained above the roof of the building.

Temporary sign: A *sign* constructed of cloth, fabric or other lightweight temporary material with or without a structural frame intended for a limited period of display; including decoration displays for holidays or public demonstrations.

Wall sign: A *sign* which is painted on or attached directly to a fence or on the surface of masonry, concrete, frame or other approved building walls, and which extends not more than 15 inches (381 mm) from the face of the fence or wall.

3102.3 Zoning law: Where more restrictive in respect to location, purpose, size or height of *signs*, the limitations of *zoning* laws that affect occupancy of land shall take precedence over the regulations of 780 CMR.

In the absence of approved rules governing details of construction, the provisions of the applicable standards listed in Appendix A shall be deemed to conform to the requirements of 780 CMR unless otherwise specified in 780 CMR 31.

Outdoor advertising subject to 711 CMR 3.00: Control and Restriction of Billboards, Signs and Other Advertising Devices (the Outdoor Advertising Board) as listed in Appendix A, and in accordance with Massachusetts General Laws Annotated, as amended, requires approval of said Board prior to the issuance of a permit.

3102.4 Permits and construction documents: Permits for *signs* shall be required as specified in 780 CMR 3102.4.1 and 3102.4.2 except as provided for in 780 CMR 3102.4.3. *Construction documents* shall be prepared and filed in accordance with 780 CMR 3102.4.4 and 3102.4.5.

3102.4.1 New signs: A new *sign* shall not hereafter be erected, constructed, *altered* or maintained except as provided for herein, and until a permit has been issued by the code official.

3102.4.2 Alterations: A *sign* shall not be enlarged or relocated unless such *sign* conforms to the provisions of 780 CMR 3102.0 for new *signs*, or until a proper permit has been secured. The changing of movable parts of an approved *sign* that is designed for such changes, or the

repainting or reposting of display matter, shall not be deemed an *alteration*, provided that the conditions of the original approval and the requirements of 780 CMR 3102.0 are not violated. operating such *sign*. The method and location of this identification shall appear on the *construction documents* filed with the code official.

3102.4.3 Permit exemptions: A permit shall not be required for the *signs* specified in 780 CMR 3102.4.3.1 through 3102.4.3.5. Such exceptions, however, shall not be construed to relieve the owner of the *sign* from responsibility for the *sign's* erection and maintenance in a safe manner.

3102.4.3.1 Wall signs: A permit shall not be required for a *sign* painted on the surface of a fence or approved building wall, or any nonilluminated wall *sign* on a building or structure which is not more than ten square feet (0.93 m^2) in area.

3102.4.3.2 Sale or rent: A permit shall not be required for ground *signs* erected to announce the sale or rent of property, provided that such *signs* are not more than 25 square feet (2.33 m^2) in area.

3102.4.3.3 Transit directions: A permit shall not be required for the erection or maintenance of a ground *sign* designating the location of a transit line, a railroad station or other public carrier provided that such *signs* are not more than three square feet (0.28 m^2) in area.

3102.4.3.4 Street signs: A permit shall not be required for ground *signs* erected by a jurisdiction for street direction.

3102.4.3.5 Projecting signs: A permit shall not be required for a projecting *sign* not exceeding 2½ square feet (0.23 m^2) of display surface.

3102.4.3.6 Government building signs: Signs erected on a municipal, state or federal building which announce the name, nature of the occupancy and information as to use of, or admission to the premises.

3102.4.4 Construction documents and owner's consent: Before any permit is issued for the erection of a *sign*, *construction documents* shall be filed with the code official showing the dimensions, materials and required details of construction, including *loads*, stresses and anchorage. The applications shall be accompanied by the *written* consent of the owner or lessee of the premises upon which the *sign* is to be erected.

3102.4.5 Identification: Every *sign* for which a permit has been issued and which is hereafter erected, constructed or maintained, shall be plainly marked with the name of the person, firm or corporation owning, erecting, maintaining or

3102.5 Maintenance and inspection: *Sign* maintenance and inspection shall comply with 780 CMR 3102.5. l through 3102.5.4.

3102.5.1 Removal: The code official is authorized to order the removal of any *sign* that is not maintained in accordance with the provisions of 780 CMR 3102.0.

3102.5.2 Maintenance: All *signs* for which a permit is required, together with all supports, braces, guys and anchors, shall be kept in repair in accordance with the provisions of 780 CMR 3102.0 and 780 CMR 1. Where not galvanized or constructed of approved corrosion-resistant noncombustible materials, *signs* shall be painted.

3102.5.3 Housekeeping: The owner or lessee of every *sign* shall maintain the immediate premises occupied by the *sign* in a clean, sanitary and healthful condition.

3102.5.4 Inspection: Every *sign* shall be subject to inspection and approval.

3102.6 General requirements: All *signs* shall be designed and constructed to comply with the provisions of 780 CMR for materials, *loads* and stresses, and with the requirements of 780 CMR 3102.6.1 through 3102.6.5.

3102.6.1 Wind load: All *signs* shall be designed and constructed to withstand wind pressure as provided for in 780 CMR 1611.12.2.

3102.6.2 Earthquake load: *Signs* designed to withstand wind pressures shall be considered capable of withstanding *earthquake loads*, except as provided for in 780 CMR 1612.0 and 1616.0.

3102.6.3 Illumination: A *sign* shall not be illuminated by other than electrical means, and electrical devices and wiring shall be installed in accordance with the requirements of 527 CMR 12.00 listed in ***Appendix A***. Any open spark or flame shall not be used for display purposes unless specifically approved.

3102.6.4 Use of combustibles: The requirements of 780 CMR 3102.6.4.1 and 3102.6.4.2 shall apply to combustible material for *signs*.

3102.6.4.1 Ornamental features: Wood or approved *plastic* as provided for in 780 CMR 26, or other materials of combustible

characteristics similar to wood, used for moldings, cappings, nailing blocks, letters and latticing, shall comply with 780 CMR 3102.7,

3102.6.4.2 Internally illuminated signs: Except as provided for malls in 780 CMR 402.14, where internally illuminated *signs* have *sign* facings of wood or approved combustible *plastic*, the area of such facing section shall not be more than 120 square feet (11.16 m^2) and the wiring for electric lighting shall be entirely enclosed in the *sign* cabinet with a clearance of not less than two inches (51 mm) from the facing material. The dimensional limitation of 120 square feet (11.16 m^2) shall not apply to *sign* facing sections made from flameresistant-coated fabric (ordinarily known as "flexible *sign* face *plastic*") that weighs less than 20 ounces per square yard (678 g/m^2) and which, when tested in accordance with NFiPA 701 listed in ***Appendix A*** meets the requirements of both the small-scale test and the large-scale test, or which, when tested in accordance with an approved test method, exhibits an average burn time for ten specimens of two seconds or less and a burning extent of 15 centimeters or less.

3102.6.5 Animated devices: *Signs* that contain moving sections or ornaments shall have fail-safe provisions to prevent the section or ornament from releasing and falling or shifting its center of gravity more than 15 inches (381 mm). The fail-safe device shall be in addition to the mechanism and the mechanism's housing which operate the movable section or ornament. The fail-safe device shall be capable of supporting the full dead weight of the section or ornament when the moving mechanism releases.

3102.7 Ground signs: The structural frame of ground *signs* shall not be erected of combustible materials to a height of more than 35 feet (10668 mm) above the ground. In all locations, where constructed entirely of noncombustible material, ground *signs* shall not be erected to a height of greater than 100 feet (30480 mm) above the ground. Greater heights are permitted where approved and located so as not to create a hazard or danger to the public.

3102.8 Roof signs: Roof *signs* shall comply with 780 CMR 3102.8.1 through 3102.8.4.

3102.8.1 Materials: All roof *signs* shall be constructed entirely of metal or other approved noncombustible material except as provided for in 780 CMR 3102.6.4. Provisions shall be made for electric grounding of all metallic parts. Where combustible materials are permitted in letters or and shall not be used for other ornamental features of *signs*, unless approved.

other ornamental features, all wiring and tubing shall be kept free and insulated therefrom.

3102.8.2 Bottom clearance: There shall be a clear space of not less than six feet (1829 mm) between the lowest part of the *sign* and the roof level, except for necessary structural supports.

3102.8.3 Closed signs: A closed roof *sign* shall not be erected to a height greater than 50 feet (15240 mm) above the roof of buildings of Types 1 and 2 construction, nor more than 35 feet (10668 mm) above the roof of buildings of Types 3, 4 and 5 construction.

3102.8.4 Open signs: An open roof *sign* shall not exceed a height of 100 feet (30480 mm) above the roof of buildings of Types 1 and 2 construction; and not more than 60 feet (18288 mm) above the roof of buildings of Types 3, 4 and 5 construction.

3102.9 Wall signs: Wall *signs* shall comply with 780 CMR 3102.9.1 and 3102.9.2.

3102.9.1 Materials: Wall *signs* which have an area exceeding 40 square feet (3.72 m^2) shall be constructed of metal or other approved noncombustible material, except for nailing rails and as provided for in 780 CMR 3102.6.4.

3102.9.2 Extension: Wall *signs* shall not be erected to extend above the top of the wall, nor to extend beyond the ends of the wall to which the *signs* are attached unless such *signs* conform to all of the requirements for roof *signs*, projecting *signs* or ground *signs*.

3102.10 Projecting signs: Projecting *signs* shall comply with 780 CMR 3102.10.1 through 3102.10.4.

3102.10.1 Materials: Projecting *signs* shall be constructed entirely of metal or other approved noncombustible material except as provided for in 780 CMR 3102.6.4.

3102.10.2 Maximum projection: A projecting *sign* shall not extend beyond a vertical plane that is two feet (610 mm) inside the curb line.

3102.10.3 Clearance: A vertical clearance of not less than eight feet (2438 mm) shall be provided below all parts of projecting *signs*.

3102.10.4 Additional loads: Projecting *sign* structures which will be used to support an individual on a ladder or other servicing device – whether or not specifically designed for the

servicing device – shall be capable of supporting the anticipated additional *load*, but not less than a 100-pound (45.4 kg) concentrated horizontal *load* and a 300-pound (136.2 kg) concentrated vertical *load* applied at the point of assumed or most eccentric *loading*. The building component to which the projecting *sign* is attached shall also be designed to support the additional *loads*.

3102.11 Marquee signs: Marquee *signs* shall comply with 780 CMR 3102.11.1 through 3102.11.3.

3102.11.1 Materials: Marquee *signs* shall be constructed entirely of metal or other approved noncombustible material except as provided for in 780 CMR 3102.6.4.

3102.11.2 Attachment: Marquee *signs* shall be attached to approved marquees that are constructed in accordance with 780 CMR 3203.11.

3102.11.3 Dimensions: Marquee *signs* shall not project beyond the perimeter of the marquee.

3102.12 Temporary signs: Temporary *signs* shall comply with 780 CMR 3102.12.1 through 3102.12.4.

3102.12.1 Banner and cloth signs: Temporary *signs* and banners which are attached to or suspended from a building, and which are constructed of cloth or other combustible material, shall be constructed in an approved manner and shall be securely supported. Such *signs* and banners shall be removed as soon as torn or damaged, and not later than 60 days after erection. Permits for temporary *signs* that are suspended from or attached to a canopy or marquee shall be limited to a period of ten days.

3102.12.2 Maximum size: Temporary *signs* of combustible construction shall not be more than 10 feet (3048 mm) in one dimension nor more than 500 square feet (46.5 m^2) in area.

3102.12.3 Supports: Where more than 100 square feet (9.3 m^2) in area, temporary *signs* and banners shall be constructed and fastened to supports that are capable of withstanding the design *loads* listed in 780 CMR 1610.0.

3102.12.4 Special permits: Temporary *signs* used for holidays, public demonstrations or promotions of civic welfare or charitable purposes, which extend across streets or other public spaces shall be subject to special approval of the authority having jurisdiction.

3102.13 Illuminated signs: Illuminated *signs* shall comply with 780 CMR 3102.13.1 through 3102.13.3.

3102.13.1 Certificates: All electrically illuminated *signs* shall be certified as to electric wiring and devices by the agency having jurisdiction, and all wiring and accessory electrical equipment shall conform to the requirements of 527 CMR 12.00 listed in ***Appendix A***.

3102.13.2 Additional permits: Electrical permits shall be issued for the erection or maintenance of illuminated *signs*.

3102.13.3 Relettering signs: The requirements of 780 CMR 3102.13 shall not apply to the relettering of illuminated *signs*, except where such relettering requires a change of wiring or piping of the *sign*.

3102.14 Portable signs: Portable *signs* shall conform to all requirements for ground, roof, projecting, flat and temporary *signs* where such *signs* are used in a similar capacity. The requirements of 780 CMR 3102.14 shall not be construed to require portable *signs* to have connections to surfaces, tie-downs or foundations where provisions are made by temporary means or configuration of the structure to provide stability for the expected duration of the installation.

3102.14.1 Electrical: Portable *signs* that require electrical service shall have a positive connecting device on the *sign*. Electrical service lines to the *sign* shall be protected from damage from all anticipated traffic.

780 CMR 3103.0 MEMBRANE STRUCTURES

3103.1 General: The provisions of 780 CMR 3103.0 shall apply to air-supported, air-inflated, *membrane*-covered cable and *membrane*-covered frame structures, collectively known as *membrane* structures, erected for a period of 90 days or longer. Those erected for a shorter period of time shall comply with the applicable provisions of the fire prevention code, 527 CMR, listed in ***Appendix A*** and 780 CMR 3104.0. *Membrane* structures covering water storage facilities, water clarifiers, water treatment plants, sewage treatment plants and similar facilities not used for human occupancy, are required to meet only the requirements of 780 CMR 3103.3.2 and 3103.6.

3103.2 Definitions: The following words and terms shall, for the purposes of 780 CMR 3103.0 and as

used elsewhere in 780 CMR, have the meanings shown herein.

Membrane: As it pertains to membrane structures, a thin, flexible, impervious material capable of being supported by an air pressure of 1.5 inches of water column (373 P).

Membrane structures

Air-inflated structure: A building where the shape of the structure is maintained by air pressurization of cells or tubes to form a barrel vault over the usable area. Occupants of such a structure do not occupy the pressurized area used to support the structure.

Cable-restrained, air-supported structure: A structure in which the uplift is resisted by cables or webbings which are anchored to either foundations or dead men. Reinforcing cable or webbing is attached by various methods to the membrane or is an integral part of the *membrane*. This is not a cable-supported structure.

Membrane-covered cable structure: A nonpressurized structure in which a mast and cable system provides support and tension to the *membrane* weather barrier and the *membrane* imparts structural stability to the structure.

Membrane-covered frame structure: A nonpressurized building wherein the structure is composed of a rigid framework to support tensioned *membrane* which provides the weather barrier.

Noncombustible membrane structure: A *membrane* structure in which the *membrane* and all component parts of the structure are noncombustible.

Tent: Any structure, enclosure or shelter which is constructed of canvas or pliable material supported in any manner except by air or the contents it protects.

3103.3 Construction requirements: Construction of *membrane* structures shall comply with 780 CMR 3103.3.1 through 3103.3.5.

3103.3.1 Type of construction: All noncombustible *membrane* structures shall be classified as Type 2C Noncombustible frame- or cable-supported structures covered by an approved *membrane* in accordance with 780 CMR 3103.3.2 shall be classified as Type 2C construction. Heavy timber frame-supported structures covered by an approved *membrane* in accordance with 780 CMR 3103.3.2 shall be classified as Type 3B construction. A noncombustible *membrane* structure that is used exclusively as a roof and is located more than 20 feet (6096 mm) above any floor, balcony or gallery, is deemed to comply with the roof construction requirements for Type 1 and Type 2 construction, provided that such a structure complies with the requirements of 780 CMR 3103. All other *membrane* structures shall be classified as Type 5B construction.

Air-supported structure: A building wherein the shape of the structure is attained by air pressure and occupants of the structure are within the elevated pressure area. Air-supported structures are of two basic types:

Double skin: Similar to a single skin, but with an attached liner that is separated from the outer skin and provides an air space which serves for insulation, acoustic, aesthetic or similar purposes.

Single skin: Where there is only the single outer skin and the air pressure is directly against that skin.

3103.3.2 Membrane material: *Membranes* shall be either noncombustible as defined by 780 CMR 704.4, or flameresistant as determined in accordance with both the small-scale and large-scale tests in NFiPA 701 listed in ***Appendix A***.

Exception: *Plastic* less than 20 mil (500 μm) in thickness, used in greenhouses where occupancy by the general public is not permitted and for aquaculture pond covers, is not required to be flameresistant.

3103.3.3 Applicability of other provisions: Except as otherwise specifically required by 780 CMR 3103.3, *membrane* structures shall meet all applicable provisions of 780 CMR. The *membrane* shall meet the roof covering requirements of 780 CMR 1506.0.

3103.3.4 Allowable floor areas: The *area* of a *membrane* structure shall not exceed the limitations set forth in Table 503, except as provided for in 780 CMR 506.0.

3103.3.5 Maximum height: *Membrane* structures shall not exceed one story nor shall such structures exceed the *height* limitations in feet set forth in Table 503.

Exception: Noncombustible *membrane* structures that serve as roof construction only.

3103.4 Inflation systems: Air-supported and air-inflated structures shall be provided with primary and auxiliary inflation systems to meet the minimum requirements of 780 CMR 3103.4.1 and 3103.4.2.

3103.4.1 Equipment requirements: The inflation system shall consist of one or more blowers and shall include provisions for automatic control to maintain the required inflation pressures. The

system shall be so designed as to prevent overpressurization of the system.

In addition to the primary inflation system, in buildings exceeding 1,500 square feet (140 m^2) in *area*, an auxiliary inflation system shall be provided with sufficient capacity to maintain the inflation of the structure in case of primary system failure. The auxiliary inflation system shall operate automatically when there is a loss of internal pressure and when the primary blower system becomes inoperative.

Blower equipment shall meet the following requirements:

1. Blowers shall be powered by continuous-rated motors at the maximum power required for any flow condition as required by the structural design.
2. Blowers shall be provided with inlet screens, belt guards and other protective devices as required by the code official to provide protection from injury.
3. Blowers shall be housed within a weather-protecting structure.
4. Blowers shall be equipped with backdraft check dampers to minimize air loss when inoperative.
5. Blower inlets shall be located to provide protection from air contamination. The location of inlets shall be approved.

3103.4.2 Standby power: Wherever an auxiliary inflation system is required, an approved standby power-generating system shall be provided. The system shall be equipped with a suitable means for automatically starting the generator set upon failure of the normal electrical service and for automatic transfer and operation of all of the required electrical functions at full power within 60 seconds of such service failure. Standby power shall be capable of operating independently for a minimum of four hours.

3103.5 Support provisions: A system capable of supporting the *membrane* in the event of deflation shall be provided for in all air-supported and air-inflated structures having an occupant load of more than 50 or where covering a swimming pool regardless of occupant load. The support system shall be capable of maintaining *membrane* structures used as a roof for Type 1 or Type 2 construction not less than 20 feet (6096 mm) above floor or seating areas. The support system shall be capable of maintaining all other *membranes* at least seven feet (2134 mm) above the floor, seating area or surface of the water.

3103.6 Engineering design: All *membrane* structures shall be structurally designed in accordance with approved criteria that are developed by a *registered design professional*.

780 CMR 3104.0 TEMPORARY STRUCTURES

3104.1 General: The provisions of 780 CMR 3104.0 shall apply to tents, *membrane* structures and other structures erected for a period of less than 180 days. Those erected for a longer period of time shall comply with 780 CMR 3103.0 or with all applicable sections of 780 CMR where 780 CMR 3103.0 is not applicable.

3104.1.1 Permit required: All temporary structures that cover an *area* in excess of 120 square feet (11.16 m^2), including all connecting *areas* or spaces with a common *means of egress* or entrance which are used or intended to be used for the gathering together of ten or more persons, shall not be erected, operated or maintained for any purpose without obtaining a permit from the code official. Tents used exclusively for recreational camping purposes shall be exempt from the above requirements. Special permits required by 780 CMR shall be secured from the code official.

3104.2 Construction documents: A permit application and *construction documents* shall be submitted for each installation of a temporary structure. The *construction documents* shall include a site plan indicating the location of the temporary structure and information delineating the *means of egress* and the occupant load.

3104.3 Location: All temporary structures shall be located in accordance with the requirements of Table 705.2 based on the fireresistance rating of the exterior walls for the proposed type of construction.

3104.4 Construction: Tents and air-supported structures shall be constructed as required by this code and NFiPA 102 listed in ***Appendix A***.

3104.5 Membrane material: The *membrane* material for all tents shall be of approved noncombustible material as defined in 780 CMR 704.4; flameresistant material as determined in accordance with both the small-scale and large-scale tests in NfiPA 701 listed in ***Appendix A***; or material treated in an approved manner to render the material flameresistant.

3104.6 Certification: An affidavit or affirmation shall be submitted to the code official and a copy retained on the premises on which the tent or air-supported structure is located. The affidavit shall attest to the following information relative to the flameresistance of the fabric:

1. Names and addresses of the owners of the tent or air-supported structure.

2. Date the fabric was last treated with flame-resistant solution.
3. Trade name or kind of chemical used in treatment.
4. Name of person or firm treating the material.
5. Name of testing agency and test standard by which the fabric was tested.

3104.7 Inflation pressure: Operating pressure shall be maintained at the design pressure specified by the manufacturer to assure structural stability and to avoid excessive distortion during high *wind* or *snow loads*.

3104.8 Door operation: In high winds over 50 mph (80.45 km/h) or in snow conditions, the doors in air-supported structures shall be controlled to avoid excessive air loss. Doors shall not be left open under any conditions.

3105.2 Design and construction: Fixed awnings, canopies and similar structures shall be designed and constructed to withstand *wind* or other *lateral loads* and *live loads* as required by 780 CMR 16 with due allowance or shape, open construction and similar features that relieve the pressures or *loads*. Structural members shall be protected to prevent deterioration.

3105.3 Canopy materials: Canopies shall be constructed of a metal framework with an approved covering, that is flameresistant as determined by both the small-scale and large-scale tests in accordance with NFiPA 701 listed in ***Appendix A*** or that has a flame spread rating not greater than 25 when tested in accordance with ASTM E84 listed in ***Appendix A***. Canopies shall be attached to the building at the inner end and supported at the outer end by not less than two stanchions, with braces anchored in an approved manner. The stanchions shall be placed not less than 44 inches (1118 mm) apart. The horizontal portion of the framework shall not be less than eight feet (2438 mm) nor more than 12 feet (3658 mm) above the walking surface and the clearance between the covering or valance and the walking surface shall not be less than seven feet (2134 mm).

3105.4 Projections: In addition to 780 CMR 3105.0, awnings and canopies that are constructed in the public right-of-way shall conform to the requirements of 780 CMR 32.

780 CMR 3106.0 PEDESTRIAN WALKWAYS

3106.1 General: An exterior elevated pedestrian walkway that connects buildings shall comply with 780 CMR 3106.0. The walkway shall not contribute to the *building area* or the number of stories or *height* of connected buildings.

3104.9 Means of egress: All temporary structures including tents and *membrane* structures shall conform to the *means of egress* requirements of 780 CMR 10 and shall have a maximum *exit access* travel distance of 100 feet (30480 mm).

780 CMR 3105.0 CANOPIES AND AWNINGS

3105.1 General: Rigid canopies or awnings supported in whole or in part by members resting on the ground and used for patio covers, car ports, summer houses or other similar uses shall comply with the requirements of 780 CMR 3105.2 through 3105.4 for design and construction. Such structures shall be braced as required to provide rigidity.

3106.1.1 Separate structures: Connected buildings shall be considered to be separate structures.

Exception: Buildings on the same lot in accordance with 780 CMR 503.1.3.

3106.2 Construction: The walkway shall be of noncombustible construction.

Exception: Combustible construction shall be permitted where all connected buildings are of combustible construction.

3106.3 Occupancy: The walkway shall not be occupied for other than low fire-hazard uses and only approved materials and decorations shall be located in the space.

3106.4 Separation assemblies between walkways and buildings: Walkways shall be separated from the interior of the building by *fire separation walls* with a fireresistance rating of not less than two hours. This protection shall extend vertically from a point ten feet (3048 mm) above the walkway roof surface or the connected building roof line, whichever is lower, down to a point ten feet (3048 mm) below the walkway and horizontally ten feet (3048 mm) from each side of the walkway. Openings within the ten-foot (3048 mm) horizontal extension of the *protected* walls beyond the walkway shall be equipped with fixed ¾-hour opening protectives.

Exception: The walls separating the walkway from a connected building are not required to have a fireresistance rating by 780 CMR 3106.4, given compliance with one of the following:
1. Where the distance between the connected buildings is more than ten feet (3048 mm), the walkway and connected buildings are equipped

throughout with an *automatic sprinkler system* in accordance with 780 CMR 906.2.1, and the wall is constructed of a tempered, wired or laminated glass wall and doors subject to the following:

1.1. The glass shall be protected by an *automatic sprinkler system* in accordance with 780 CMR 906.2.1 and the *sprinkler* system shall completely wet the entire surface of interior sides of the glass wall when actuated.

1.2. The glass shall be in a gasketed frame and installed in such a manner that the framing system will deflect without breaking (loading) the glass before the *sprinkler* operates.

1.3. Obstructions shall not be installed between the *sprinkler* heads and the glass;

2. Where the distance between the connected buildings is more than ten feet (3048 mm), and both sides are at least 50% open with the open area uniformly distributed to prevent the accumulation of smoke and toxic gases;

3. Buildings on the same *lot*, in accordance with 780 CMR 503.1.3; or

4. Where exterior walls of connected buildings are required by 780 CMR 705.0 to have a fireresistance rating greater than two hours, the walkway shall be equipped throughout with an *automatic sprinkler system* installed in accordance with 780 CMR 9.

1. *Exit access* travel distance on a walkway equipped throughout with an *automatic sprinkler system* in accordance with 780 CMR 9 shall not exceed 250 feet (76200 mm) in length.

2. *Exit access* travel distance on a walkway constructed with both sides at least 50% open shall not exceed 300 feet (91440 mm) in length.

780 CMR 3107.0 FLOOD-RESISTANT CONSTRUCTION

3107.1 General: All buildings and structures erected in areas prone to flooding shall be constructed and elevated as required by the provisions of 780 CMR 3107.0.

3107.2 Definitions: The following words and terms shall, for the purposes of 780 CMR 3107, and as used elsewhers in 780 CMR, have the meanings shown herein:

A-Zones: Flood-hazard zones- all areas which have been determined to be prone to flooding, but not subject to high-velocity waters or wave action.

Base Flood Elevation: The flood having a 1% chance of being equalled or exceed in any given year and shall be used to define areas prone to flooding, and describe at a minimum, the depth or peak elevation of flooding.

Basement/cellar: Any area of the building having its floor subgrade (Below ground level) on all sides.

3106.5 Public way: The installation of a pedestrian walkway over a *public way* shall be subject to the approval of local authorities. Construction criteria for approved walkways shall meet the requirements of 780 CMR 3106.0.

3106.6 Egress: Access shall be provided at all times to a pedestrian walkway that serves as a required *exit*.

3106.7 Width: The unobstructed width of pedestrian walkways shall not be less than 36 inches (914 mm). The total width shall not exceed 30 feet (9144 mm).

3106.8 Exit access travel: The length of *exit access* travel shall not exceed 200 feet (60960 mm).

Exceptions:

Breakaway Wall: A wall that is not part of the structural support of the building and intended, through its design and construction, to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

Elevation: The placement of a structure above flood level to minimize or prevent flood damages.

Flood Hazard Zones: Areas which have been determined to be prone to flooding but not to high velocity waters or wave action. (A ZONES)

Floodproofing: Any combination of structural and non-structural additions, changes or adjustments to structures which reduce or eliminate flood damage to new or substantially improved structures.

F.E.M.A.: Federal Emergency Management Agency.

Flood Insurance Rate: Flood insurance rate map (FIRM) means an official map of a community, which delineates both the special hazard areas and the risk premium zones applcable to the community.

Flood Proofing: Any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to non-residential structures.

High-hazard Zones (V Zones) Areas of tidal influence which have been determined to be subject to wave run heights in excess of three

feet or subject to high-velocity wave run-up or wave-induced erosion (V Zones).

***Highest Adjacent Grade:** The highest natural elevation of the ground surface, prior to construction, adjoining the proposed foundation walls of a structure.*

***Impact Loads:** Loads induced by the collision of solid objects on a structure carried by floodwater.*

***Lowest Floor:** The lowest floor of the lowest enclosed area (including basement/cellar). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or incidental storage in an area other than a basement/cellar with appropriate hydrostatic openings as required in 780 CMR 3107.5.3 is not considered a building's lowest floor.*

***Manufactured Home:** See DEFINITIONS, 780 CMR 3502.*

***Scouring:** The erosion or washing away of slopes or soil by velocity waters.*

***Special Hazard Zones:** An area having special flood, and/or flood-related erosion hazards and shown on a Flood Hazard Boundry Map or FIRM as Zone A, AO, A1-30, AE, A99, AH, VO, V1-30, VE, V.*

***Start of Construction:** The date the building permit was issued, provided the actual start of construction, repair, reconstruction, placement, or other improvement was within 180 days of the permit date. The actual start means the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation or the placement of a manufactured home on a foundation.*

***Structure:** A walled and roofed building, including a gas or liquid storage tank, that is principally above ground and affixed to a permanent site, as well as a manufactured home.*

Substantial Improvements: Substantial improvement means any reconstruction, rehabilitation, addition, repair or improvement of a structure, the cost of which equals or exceeds 50% of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "Substantial damage", regardless of the actual repair work performed. Substantial improvement does not, however, include either:

1. any project for improvement of a structure to correct existing violations of state or local health. sanitary, or safety codes which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions or

2. any alteration of a "Historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure."

Note 1: The following items can be excluded from the cost of improvement or repair: plans, specifications, survey, permits, and other items which are separate from or incidental to the repair of the damaged or improved building. i.e. debris removal/cartage.

Note 2: The latest Assessors'structure value may be used, provided that the Assessors certify that said value is based on 100% valuation, less depreciation.

V Zones: Areas of tidal influence which have been detemmined to be subject to wave run heights in excess of three feet or subject to high-velocity wave run-up or wave-induced erosion. (V Zones)

Variance: A grant of relief by a community and the Commonwealth, via the Boards of Appeal, from the terms of the Floodplain Management Regulations.

Venting A system designed to allow flood waters to enter an enclosure, usually the interior of foundations walls, so that the rising water does not create a dangerous differential in hydrostatic pressure; usually achieved through openings in the walls. Vents may be installed in garage doors to satisfy this requirement, provided such vents are installed consistent with 780 CMR 3107. The necessity of human intervention, such as opening garage doors, does not satisfy this requirement.

3107.3 Base flood elevation: The base flood elevation shall be used to define areas prone to flooding, and shall describe, at a minimum, the depth or peak elevation of flooding (including wave height) which has a 1% (100-year flood) or greater chance of occurring in any given year.

The 100-year flood elevation shall be determined as follows:

1. In A1-30, AH, AE, V1-30 and VE, the Base Flood Elevation is provided on the community's Flood Insurance Study and the Flood Insurance Rate Map (FIRM).

2. In AO zones, add the depth provided on the Flood Insurance Rate Map to the highest adjacent grade. If no depth is provided, add at least two feet to the highest adjacent grade.

3. In A, A99 and V zones, the building official, design professional, or surveyor shall obtain, review and reasonably utilize and Base Flood Elevation Data available from a federal, state or other reliable sources.

3107.4 Hazard zones: Areas which have been determined to be prone to flooding shall be classified as either flood-hazard zones (A Zones) or high-hazard zones (V Zones) in accordance with 780 CMR 3107.5 and 3107.6.

3107.5 Flood-hazard zones (A Zones): All areas which have been determined to be prone to flooding but not subject to high-velocity waters or wave action shall be designated as floodhazard zones. All buildings and structures as defined in 780 CMR 3107.2 erected ***or substantially improved*** in floodhazard zones shall be designed and constructed in accordance with 780 CMR 3107.5.1 through 3107.5.4. ***Plans for such construction or improvements shall be prepared by a qualified registered professional engineer or architect to ensure the compliance with 780 CMR 3107.5.***

Exception: a proposed addition that triggers the substantial improvement requirements shall be constructed according to the provisions of 780 CMR 3107.5. However, the existing structure is not required to be brought into compliance with 780 CMR 3107.5, provided that the addition IS NOT an additional story(s) which relies on the support of the existing structure.

Should the construction of an additional story(s) meet the substantial improvement definition, the existing structure shall then meet all the applicable provisions of 780 CMR 3107.5.

3107.5.1 Elevation: All buildings or structures erected within a flood-hazard zone shall be elevated so that the lowest floor is located at or above the base flood elevation. All *basement/ cellar* floor surfaces shall be located at or above the base flood elevations.

Exceptions:

1. Floors of occupancy in any use group, other than use group R, below the base flood elevation shall conform to 780 CMR 3107.5.4.

2. Floors of occupancies in any use group which are utilized solely for structure means of egress, incidental storage garages and parking, and which are located below the base flood elevation, shall conform to 780 CMR 3107.5.3.

3107.5.2 Anchorage: The structural systems of all buildings or structures shall be designed, connected and anchored to resist flotation, collapse or permanent lateral movement due to structural *loads* and stresses from flooding equal to the base flood elevation and shall be designed in accordance with 780 CMR 1615.3 and 1615.4.

3107.5.3 Enclosures below base flood elevation: Enclosed spaces below the base flood elevation shall not be used for human occupancy with the exception of structure *means of egress*, entrance foyers, *stairways* and incidental storage. Fully enclosed spaces shall be designed to equalize automatically hydrostatic forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement shall either be certified by a *registered design professional* in accordance with 780 CMR 3107.12 or conform to the following minimum criterion: a minimum of two openings having a total net area of not less than one square inch (645 mm^2) for every one square foot (0.1 m^2) of enclosed area subject to flooding shall be provided. The bottom of all openings shall not be higher than 12 inches (305 mm) above grade immediately adjacent to the location of the opening. Openings shall not be equipped with screens, louvers, valves or other coverings or devices unless such devices permit the automatic entry and discharge of floodwaters.

3107.5.4 Water-resistant construction: Occupancies in any use group other than Use Group R shall, in lieu of meeting the elevation provisions of 780 CMR 3107.5.1, be erected with floors usable for human occupancy below the base flood elevation provided that the following conditions are met:

1. All space below the base flood elevation shall be constructed with walls and floors that are substantially impermeable to the passage of water.
2. All structural components subject to hydrostatic and hydrodynamic *loads* and stresses during the occurrence of flooding to the base flood elevation shall be capable of resisting such forces, including the effects of buoyancy.
3. All openings below the base flood elevation shall be provided with water-tight closures and shall have adequate structural capacity to support all flood *loads* acting upon the closure surfaces
4. All floor and wall penetrations for plumbing, mechanical and electrical systems shall be made water tight to prevent floodwater seepage through spaces between the penetration and wall construction materials. Sanitary sewer and storm drainage systems that have openings below the base flood elevation shall be provided with shutoff valves or closure devices to prevent backwater flow during conditions of flooding.

3107.6 High-hazard zones (V Zones): Areas of tidal influence which have been determined to be subject to wave heights in excess of three feet (914 mm) or subject to high-velocity wave run-up or wave-induced erosion shall be classified as high-hazard zones. All buildings or structures erected in a high-hazard zone shall be designed and constructed in accordance with 780 CMR 3107.6.1 through 3107.6.4. ***Plans for such construction shall be prepared by a registered professional engineer or architect to ensure compliance with 780 CMR 3107.6***

Exception: a proposed addition that triggers the substantial improvement requirements shall be constructed according to the provisions of 780 CMR 3107.6. However, the existing structure is not required to be brought into compliance with 780 CMR 3107.6, provided that the addition IS NOT an additional story(s) which relies on the support of the existing structure.

Should the construction of an additional story(s) meet the substantial improvement definition, the existing structure shall then meet all the applicable provisions of 780 CMR 3107.6.

Note: Areas shown as V Zones on the most recent Flood Insurance Rate Map published by the Federal Emergency Management Agency shall be considered in establishing high-hazard zones.

3107.6.1 Elevation: All buildings or structures erected within a high-hazard zone shall be elevated so that the lowest portion of all structural members supporting the lowest floor, with the exception of mat or raft foundations, piling, pile caps, columns, grade beams and bracing, is located at or above the base flood elevation.

3107.6.2 Enclosures below base flood elevation: All spaces below the base flood elevation in a high-hazard zone shall not be used for human occupancy and shall be free of obstruction except as permitted herein:

1. Mat or raft foundations, piling, pile caps, bracing, grade beams and columns which provide structural support for the building.
2. Entrances and *exits* which are necessary for required ingress and *means of egress*.

3. Incidental storage of portable or mobile
4. Walls and partitions are permitted to enclose all or part of the space below the elevated floor provided that such walls and partitions are not part of the structural support of the building and are constructed with insect screening, open wood lattice, or nonsupporting walls designed to break away or collapse without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system due to the effect of *wind loads* as specified in 780 CMR 1611.0 and water *loads* as specified in 780 CMR 1615.0 acting simultaneously. Any such nonsupporting solid wall shall be certified as specified in 780 CMR 3107.12.3.

3107.6.3 Foundations: All buildings or structures erected in high-hazard zones shall be supported on pilings or columns and shall be adequately anchored to such pilings or columns. The piling shall have adequate soil penetrations to resist the combined wave and *wind loads* (lateral and uplift) to which such piles are likely to be subjected during a flood to the base flood elevation. Pile embedment shall include consideration of decreased resistance capacity caused by scour of soil strata surrounding the piling. Pile system design and installation shall also be made in accordance with the provisions of 780 CMR 1816.0 and 1817.0. Mat or raft foundations which support columns shall not be permitted where soil investigations required in accordance with 780 CMR 1802.1 indicate that soil material under the mat or raft is subject to scour or erosion from wave-velocity flow conditions.

3107.6.4 Repair or Replacement of Existing Foundations: Existing foundations may be repaired without further compliance with 780 CMR 3107 unless the work required is determined to be substantial as defined herein.

Exception: Existing foundation systems which are replaced in total or which are replaced so as to constitute new construction shall meet the requirements of 780 CMR 3107.6 regardless of whether the work required is substantial.

3107.7 Protection of mechanical and electrical systems: New and replacement electrical equipment and heating, *ventilating*, air conditioning and other service equipment shall be either placed above the base flood elevation or protected so as to prevent water from entering or accumulating within the system components during floods up to the base flood elevation in accordance with the mechanical code listed in ***Appendix A***. Installation of electrical wiring and outlets, switches, junction boxes and panels below the base flood elevation shall conform to the provisions of 527 CMR 12.00 listed in ***Appendix A*** for location of such items in wet locations. Duct insulation subject to water damage shall not be installed below the base flood elevation.

items readily moved in the event of a storm.

3107.8 Construction materials, methods and practices: All buildings or structures erected in flood-hazard zones (A Zones) or in high-hazard zones (V Zones) shall be constructed with materials resistant to flood damage and be constructed by methods and practices that minimize flood damage. Construction materials shall be resistant to water damage in accordance with the provisions of 780 CMR 1808.0, 1810.2,1813.4, 2307.2, 2309.1, 2311.4, 2311.6 and 2503.4.

3107.9 Mobile units: New or replacement *mobile units* to be located in any hazard zone shall be placed in accordance with the applicable elevation requirements of 780 CMR 3107.5.1 and 3107.6.1 and the anchor and tie-down requirements of 780 CMR 35.

3107.10 Alterations, renovations and repairs: Alterations, renovations and repairs to existing buildings located in any hazard zone shall comply with all applicable provisions of 780 CMR. Compliance with 780 CMR 3107 is not required unless such alteration, renovation or repairs constitute substantial improvements as defined in 780 CMR 3107.2.

Exception: Repair or replacement of existting foundations shall comply with 780 CMR 3107.6.4.

3107.11 Increases in building height and floor area: ***See 780 CMR 3107.5 Exception and 3107.6 Exception***.

3107.12 Certifications: Certifications shall be submitted in accordance with 780 CMR 3107.12.1 through 3107.12.3.

3107.12.1 As-built elevation certifications: A licensed land surveyor or *registered design professional* shall certify the actual elevation (in relation to base flood elevation) of the lowest structural member required to be elevated by the provisions of 780 CMR 12.

3107.12.2 Waterresistant construction: Where buildings or structures are to be constructed in accordance with 780 CMR 3107.5.4, the code official shall require that a *registered design professional* provide *construction documents* showing proposed details of floor, wall and foundation support components, loading computations and other essential technical data used in meeting the conditions of 780 CMR

3107.5.4. The *construction documents* shall be accompanied by a statement bearing the signature of the *registered design professional* indicating that the design and proposed methods of

3107.12.3 High-hazard construction: Where buildings or structures are to be constructed in accordance with 780 CMR 3107.6, the code official shall require that a *registered design professional* provide *construction documents* showing proposed details of foundation support and connection components which are used in meeting the requirements of 780 CMR 3107.6.3. Where solid walls or partitions are proposed below the base flood elevations, wall, framing and connection details of such walls shall be provided, including *loading* computations for the wall and foundation system used in meeting the conditions of 780 CMR 3107.6.2. The *construction documents* shall be accompanied by a statement bearing the signature of the *registered design professional* indicating that the design and proposed methods of construction are in accordance with all applicable provisions of 780 CMR 3107.6.

780 CMR 3108.0 RADIO AND TELEVISION TOWERS

3108.1 General: Subject to the structural provisions of 780 CMR 1611.0 for *wind loads* and the requirements of 780 CMR 1510.0 governing the fireresistance ratings of buildings for the support of roof structures, all radio and television towers shall be designed and constructed as herein provided.

3108.2 Location and access: Towers shall be located and equipped with step bolts and ladders so as to provide ready access for inspection purposes. Guy wires or other accessories shall not cross or encroach upon any street or other public space, or over any electric power lines, or encroach upon any other privately owned property without *written* consent of the owner.

3108.3 Construction: All towers shall be constructed of approved corrosion-resistant noncombustible material. The minimum type of construction of isolated radio towers not more than 100 feet (30480 mm) in height shall be Type 4.

3108.4 Loads: Towers shall be designed to resist *wind loads* in accordance with EIA 222-E listed in ***Appendix A.*** Consideration shall be given to conditions involving *wind load* on ice-covered sections in localities subject to sustained freezing temperatures.

3108.4.1 Dead load: Towers shall be designed for the *dead load* plus the ice *load* in regions where ice formation occurs.

construction are in accordance with all applicable provisions of 780 CMR 3107.5.4.

3108.4.2 Uplift: Adequate foundations and anchorage shall be provided to resist two times the calculated wind uplift.

3108.5 Grounding: All towers shall be permanently and effectively grounded.

780 CMR 3109.0 RADIO AND TELEVISION ANTENNAS

3109.1 Permits not required: A building permit is not required for roof installation of antennal structures not more than 12 feet (3658 mm) in height for private radio or television reception. Such a structure shall not be erected so as to injure the roof covering, and when removed from the roof, the roof covering shall be repaired to maintain weather and water tightness. The installation of any antennal structure mounted on the roof of a building shall not be erected nearer to the *lot line* than the total height of the antennal structure above the roof, nor shall such structure be erected near electric power lines or encroach upon any street or other public space.

3109.2 Permits required: Approval shall be secured for all roof-mounted antennal structures more than 12 feet (3658 mm) in height above the roof. The application shall be accompanied by detailed drawings of the structure and methods of anchorage. All connections to the roof structure shall be properly flashed to maintain water tightness. The design and materials of construction shall comply with the requirements of 780 CMR 3108.3 for character, quality and minimum dimension.

3109.3 Dish antennas: An antenna consisting of a radiation element which transmits or receives radiation signals generated as electrical, light or sound energy, and supported by a structure with or without a reflective component to the radiating dish, usually in a circular shape with a parabolic curve design constructed of a solid or open mesh surface, shall be known as a dish antenna.

3109.3.1 Permits: The approval of the code official shall be secured for all dish antennal structures more than two feet (610 mm) in diameter erected on the roof of or attached to any building or structure. A permit is not required for dish antennas not more than two feet (610 mm) in diameter erected and maintained on the roof of any building.

3109.3.2 Structural provisions: Dish antennas larger than two feet (610 mm) in diameter shall be

subject to the structural provisions of 780 CMR 1610.0,1611.0 and 3108.4. The snow *load* provisions of 780 CMR 1610.0 shall not apply where the antenna has a heater to melt falling snow.

780 CMR 3110.0 WINDOW-CLEANING SAFEGUARDS

3110.1 General: All buildings and structures over 50 feet (15240 mm) or four stories in *height*, in which the windows are cleaned from the outside, shall be provided with anchors, belt terminals or other approved safety devices for all window openings. Such devices shall be of an approved design, and shall be constructed of corrosion-resistant materials securely attached to the window frames or anchored in the enclosure walls of the building. Cast-iron or cast-bronze anchors shall be prohibited.